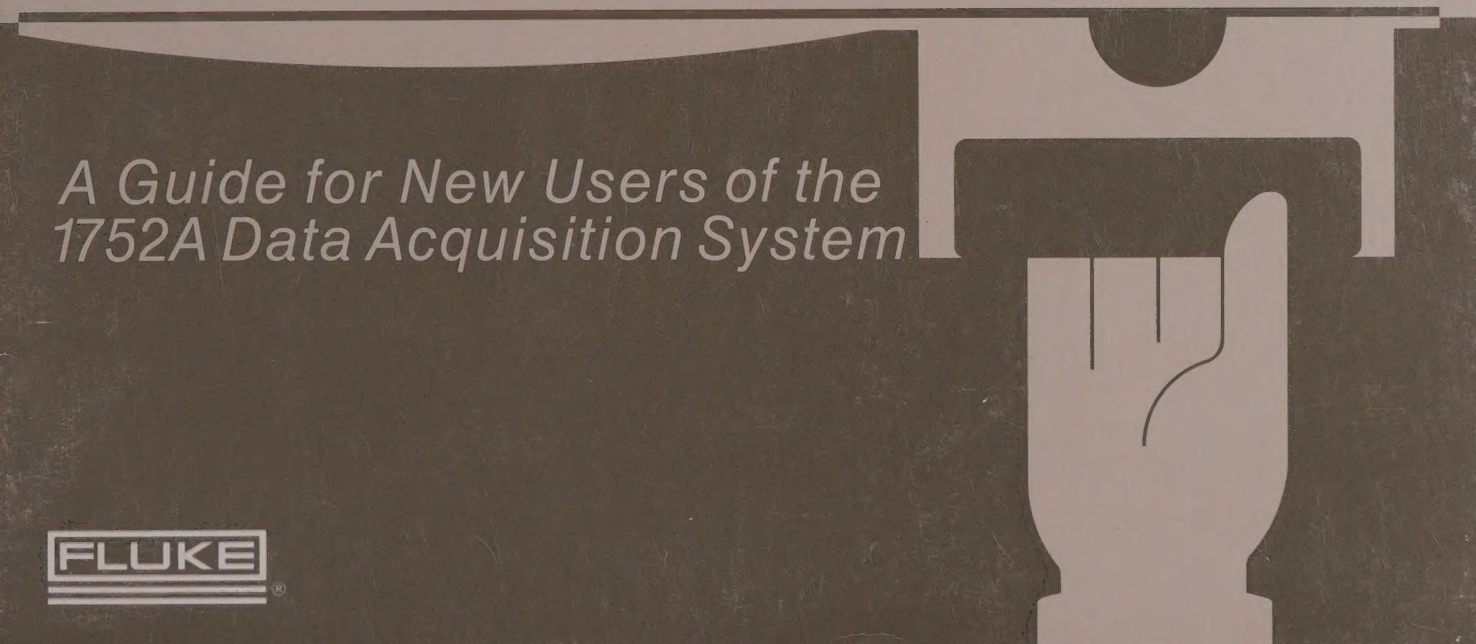
Getting Started

A Guide for New Users of the 1752A Data Acquisition System



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Getting Started

A Guide for New Users of the 1752A Data Acquisition System

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CONTENTS OF THE GUIDE FOR NEW USERS

START WITH THIS GUIDE if this is your first experience with the Fluke Model 1752A. It contains all of the information you will need to ensure a successful first encounter. After you feel comfortable with the 1752A, continue on to the description of "The Manual Set". It will help you select the book you need next.

Enjoy your 1752A!

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MEET THE 1752A DATA ACQUISITION SYSTEM

Your 1752A Data Acquisition System is a powerful and versatile instrument for measurement and control. Its unique Touch-Sensitive Display allows you to create a friendly and easy-to-use operator interface tailored to your application needs. Here are just a few features of the 1752A:

- ☐ An extensive easy-to-use BASIC interpreter with a program editor that checks for syntax errors as lines are entered.
- ☐ A consistent file structure that manages system software, program files, and data files in the same way.
- ☐ A complete set of BASIC and system commands that allow you to prepare disks and organize your files easily.
- ☐ A touch-sensitive graphics and character display that allows you to plot data results and serves as the primary system user interface.
- ☐ Full capability to operate as an instrument controller with its standard-equipment IEEE-488 and RS-232 interface module.
- ☐ A variety of single-word, BASIC commands that simplify the task of writing programs for both data acquisition and IEEE-488-compatible instrument control.
- ☐ An Analog Measurement Processor capable of acquiring 32 channels of data at 1,000 readings per second.

THE KEYBOARD AND FRONT PANEL

Locate the following items:

The Touch-Sensitive Display

Touch-sensitive high-resolution graphics and character display.

Front Panel Controls

RESTART reloads system software and performs your defined startup sequence leaving any programs and data files stored on E-Disk (Electronic Disk)intact. ABORT stops a program while it's running. Press RESTART and ABORT together to clear memory and perform a self test followed by a normal RESTART.

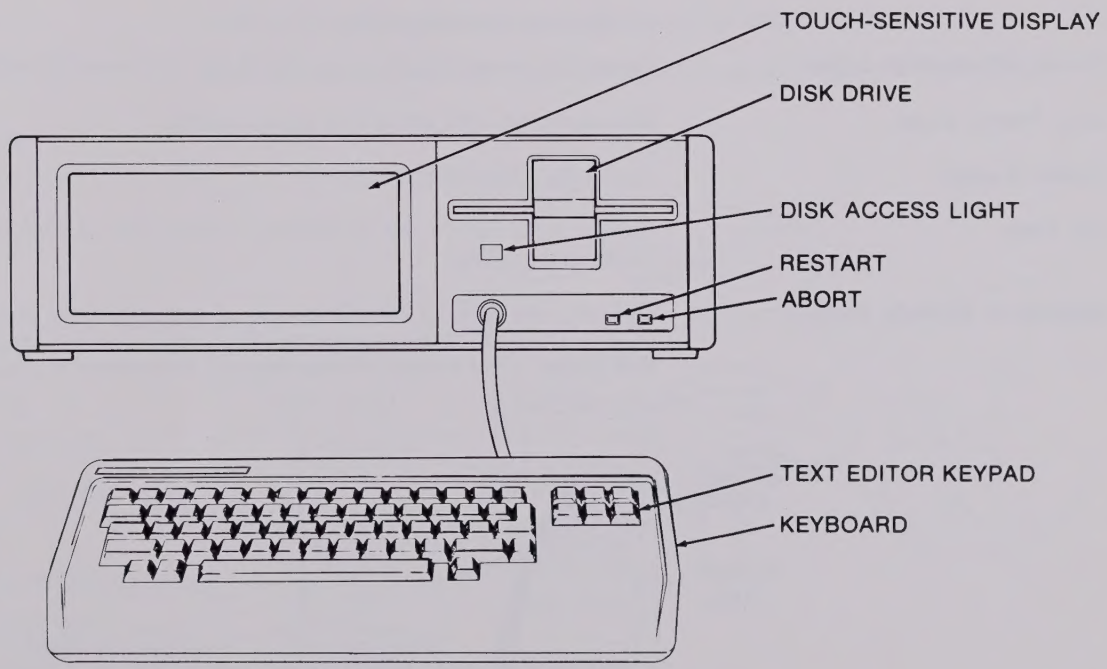
Disk Drive

5-1/4 inch 400K byte removable disk stores programs and data files.

Keyboard

- ☐ The Keyboard connects to the 1752A Front Panel.
- ☐ It is used for program generation or keyboard control of the 1752A.
- ☐ It generates the full ASCII (American Standard Code for Information Interchange) character set and has a keypad for text editor functions.

THE KEYBOARD AND FRONT PANEL



THE REAR PANEL

Locate the following items:

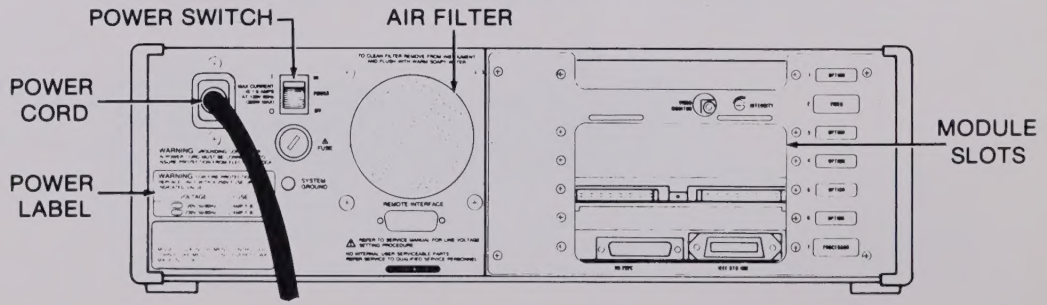
Power Information Label — Contains power information. Check for compatibility with local line power.

Line Power Cord — Connects the 1752A to a line power outlet.

Power Switch — Turns the 1752A on or off.

Air Filter — Filters dust out of the incoming cooling air. Allow clearance behind the 1752A for cooling.

Additional Module Slots — Options are factory installed only if requested in your order. Only option 1752A-010 Analog Measurement Processor is required for the exercises in this guide. (One Analog Measurement Processor is provided per 1752A).



DISKS

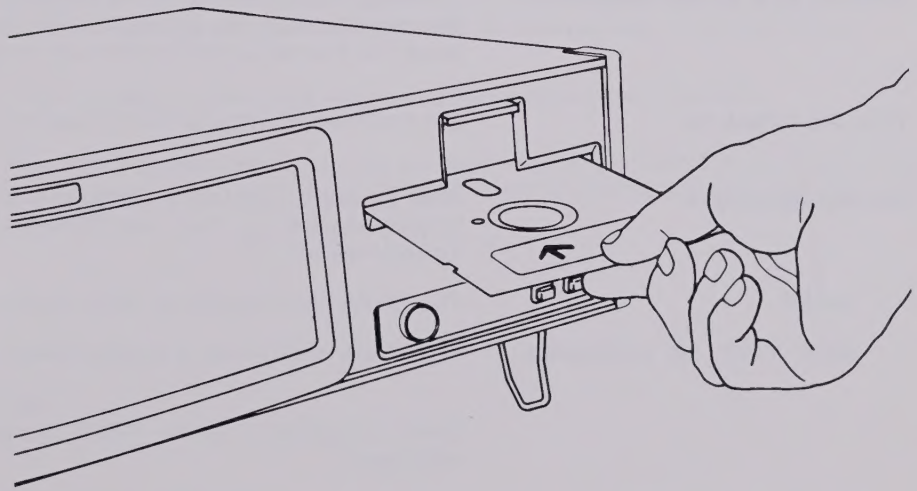
Disks are removable storage media for programs and data files.

During insertion and removal, hold the disk as shown in the illustration.

NEVER TOUCH THE DISK'S SURFACE

KEEP THE DISK AWAY FROM MAGNETIC FIELDS

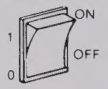
NEVER BEND THE DISK



TURNING THE 1752A ON

Remove Drive Protector

Open the Disk Drive latch and remove the cardboard shipping protector.

Check to make sure the Power Switch is OFF. 

Connect to a Power Source

Connect the Keyboard to the Front Panel. Connect the Power Cord to the Rear Panel, then into a power outlet. Refer to the 1752A System Guide if you need more detailed information on power requirements.

Turn the 1752A on

Set the Power Switch to the ON position.

Display Messages

After power is applied, a series of system messages is displayed while the display warms up. You may not see each message unless the 1752A is already warm:

`HELLO` The 1752A has initiated its internal start sequence.

`SELF TEST IN PROGRESS` The 1752A is performing a test of major components.

NOTE

Refer to Section 3 of the 1752A System Guide if any error messages are displayed.

TURNING THE 1752A ON

Insert the Getting Started Disk

As shown earlier, gently insert the Getting Started disk, label side up, into the Disk Drive until it is fully seated. Be careful not to touch the disk surface, and do not force the disk into place. Close the Disk Drive door.

Touch the Display

If the message "?Disk not ready..." is displayed, the disk was not in place when the 1752A attempted to load the system program. If this happens, check the disk to ensure that it is properly inserted and touch the display.

```
LOADING
```

1752A System Software is being read into memory from the disk.

```
Startup Command File
execution in progress
please standby...
```

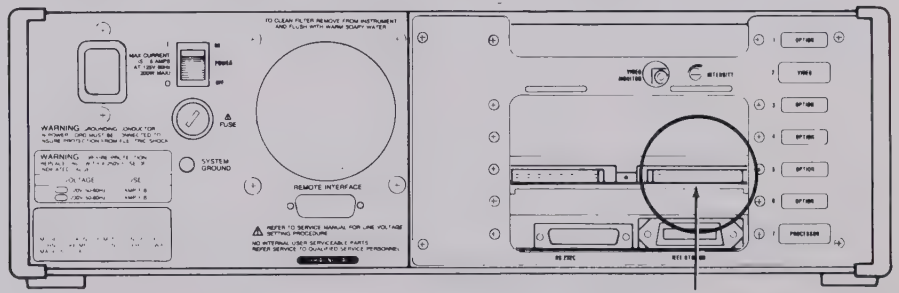
The start-up sequence stored on the Getting Started disk is now being performed. The last step in this sequence starts the Getting Started program.

THE GETTING STARTED PROGRAM

Hardware Setup

Your 1752A Getting Started Package includes a solar cell to be used as a getting started aid. (You must save this solar cell after you are finished with this guide. You will need it later as a calibration and testing aid). Before you proceed with the Getting Started Program, you need to attach this solar cell to your 1752A Analog Measurement Processor. (To run the Getting Started Program and a sample program later in this guide, a 1752A-010 Analog Measurement Processor must be installed in the 1752A chassis.)

The diagram shows where to attach the solar cell. Connect the cable to the Analog Measurement Processor connector on the right (furthest from the 1752A POWER switch). The connector is keyed so that it will only connect in the proper manner. If the connector does not seem to fit, try inverting it. Set the switch on the solar cell demo aid to the "S" position.



Connect the solar cell ribbon connector here.

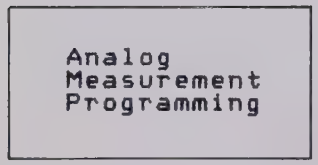
THE GETTING STARTED PROGRAM

Running the Getting Started Program

The Getting Started Program is divided into three parts; Analog Measurement Programming, Real-Time Graphics, and Data Capture. Each part of the program is entered through the Getting Started Menu.

The Getting Started Program uses the solar cell, so before running the program, place the solar cell under a light source. (Normal office light is adequate.) When you run the program you can wave your hand over the solar cell and watch the variation of the readings on the display.

You can exit any part of the Getting Started Program by pressing the ABORT button on the front panel. To return to the Getting Started Menu, type MENU and press the RETURN key. You can also return to the Getting Started Menu by pressing the appropriate soft keys when they appear. (Soft keys are touch-sensitive blocks on the display.)



Touch the soft key labeled Analog Measurement Programming. A board-setup display appears. Along the bottom of the display is a row of soft keys. Press the one labeled CHAN. A bar graph showing the voltage generated by the solar cell appears at the right of the display. Wave your hand over the solar cell and watch the bar graph. Try other values of FILTER and see what difference that makes.

THE GETTING STARTED PROGRAM

Touch the soft key labeled SCAN. Readings on all 32 channels are displayed, and an approximate representation of the reading rate is printed at the top of the display. This program shows you how quickly the 1752A can respond to readings under program control. The program is in Compiled BASIC, which runs considerably faster than Interpreted BASIC. Press MENU to return to the Getting Started Menu.

From the Getting Started Menu, touch the soft key labeled Real Time Graphics. This causes the 1752A to plot a graph of the solar cell voltage in real time. Wave your hand over the solar cell and you can see dips in the plot caused by your hand's shadow. This program also shows how fast a Compiled BASIC program runs on the 1752A. To freeze a reading press the soft key labeled Hold. To return to the Getting Started Menu press Menu.

From the Getting Started Menu, touch the soft key labeled Data Capture. This brings you to the Data Capture Menu. Pressing the soft key labeled Start from this menu causes the 1752A to take solar cell readings for about three seconds and then plot the results in a long graph. Press Start, then immediately start waving your hand over the solar cell. Continue waving your hand for about three seconds.

THE GETTING STARTED PROGRAM

After a few seconds, a graph appears on the display. Press the soft key labeled Move Left. The graph moves across the screen while the soft keys remain fixed. See how far you can move the graph by leaving your finger on the Move Left soft key. You can see that the width of the screen does not limit the length of a graph you can display. This program shows you some things you can do with the graphics capabilities of the 1752A.

To return to the Data Capture Menu, press the soft key labeled Data Capture Menu. From there you can run the Data Capture program again, or return to the Getting Started Menu by pressing the appropriate soft key.

The Data Capture Program can also be used to capture data relating to a limit on the input being exceeded. To turn this feature on and select the limit sense ($>$ or $<$), touch the Limit Trigger soft key. To select the value of the limit, touch the Limit Value soft key. To set the amount of data to be captured before the limit is exceeded, touch the Pre Event key.

WRITING A BASIC PROGRAM

Getting Ready

If you have not done so, connect the Keyboard to the Front Panel.

From the Getting Started Menu, press the soft key labeled BASIC Programming. The prompt Ready will appear on the display.

A Short BASIC Program

Type in the following BASIC program. You must press RETURN at the end of each line:

```
10 LINK "AIOLIB"
20 Y = 0
30 K = KEY \ WAIT FOR KEY
40 AIREAD(0%,Y)
50 PRINT USING "S##.##","READING: ";Y;"V"
60 GOTO 30
70 END
```

Making Corrections

If you make a mistake, press DELETE to back up. Then correct the error. If you have already entered the line and have pressed RETURN, just retype the line with the same line number to replace it.

Run Your Program

Type RUN, then press RETURN.

Error Detection

If your program contains any errors, it will stop and tell you which line was in error. For example, if you had entered line 10 as

```
10 LIBK "AIOLIB"
```

you will get the error message "!Syntax error nn at line 10" (nn is an error code number). Just retype the line, and the program will replace the line containing the error with the corrected line.

Using Your Program

If you do not get any error messages, touch the display. You will see a reading of the solar cell voltage displayed on the screen. Every time you touch the display, the 1752A takes another reading. This program demonstrates how easy it is to program the 1752A to take a reading on command from a soft key touch and display the reading.

SAVING YOUR PROGRAM

Stop Your Program

Press ABORT (on the front panel). This will stop your program.

List It

Type LIST, then press RETURN. You will see a copy of your program taken from main memory. If you were to clear memory again (DELETE ALL), or turn the 1752A off, you would lose your program and have to retype it.

Save It

Type SAVE "SOLAR", then press RETURN. The disk access light indicates that your program is being saved on the disk.

LOOKING ON THE DISK

The File Directory

Type QDIR (short for Quick DIRectory), then press RETURN. You will see a list of the files on the Getting Started disk. At the end of the list you will see SOLAR.BAS. That is the program that you just saved. The 1752A added the ".BAS" to indicate that it is a BASIC program.

File Types

Take a look at the list of files. Notice that the 1752A uses three-letter suffixes to identify different types of files. Files may contain system software, utility programs (such as editors), data arrays, text, and programs in a variety of programming languages. As you become familiar with 1752A file-handling tools, you will find that files are all treated the same except where the file type makes a difference. The 1752A System Guide contains complete descriptions of the file name suffixes used by the 1752A to identify the file type.

Fixing Typing Errors

Type 〈CTRL〉/R (hold down CTRL then press R). Notice that the QDIR command you just entered is displayed again. If you had typed it incorrectly, you could use the left and right arrow keys to go back in and fix it. In fact the DEL CHAR and DEL LINE keys also work for this.

The 1752A saves the commands that you enter in case you want to recall them and use them again. When you use this recall feature, it activates the editing keypad so you can make changes. You will find this convenience saves typing.

RETRIEVING YOUR PROGRAM

Run It

Type RUN, then press RETURN. Touch the display, and you will see that your program is still intact in memory and runs just fine.

Press ABORT to stop your program.

Delete It

Type DELETE ALL, then press RETURN to clear memory.

Type RUN, then press RETURN. The 1752A displays Ready to indicate that there was no program to run.

Retrieve It

Type RUN "SOLAR", then press RETURN. The 1752A now turns on the disk, finds your program, and begins running it. Try touching the display to make sure that your program is running.

Delete It Again

Press ABORT to stop the program. Type DELETE ALL, then press RETURN.

Type LIST, then press RETURN. The 1752A displays Ready to indicate that there is no program in memory to list.

RETRIEVING YOUR PROGRAM

Retrieve It Again

Type OLD "SOLAR", then press RETURN. The 1752A turns on the disk, finds your program, reads it into memory, and displays Ready.

List It

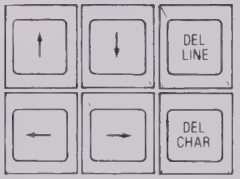
Type LIST, then press RETURN. Your program is now in memory again.

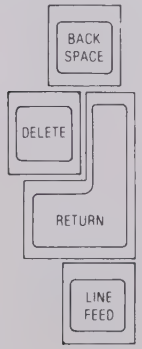
Type RUN, then press RETURN. Your program begins running again.

As you can see, the command RUN "program" finds your program on the disk, reads it into memory, and starts running it. OLD "program" finds your program on the disk and reads it into memory without running it.

USING THE BASIC EDITOR

The Editor Keys





Press ABORT to stop your program.

Type EDIT, then press RETURN. Your program will be displayed with the cursor at the beginning of the first line.

Experiment with the arrow keys to move the cursor around in your program.

Try BACK SPACE. It moves the cursor to the beginning of the line.

Try LINE FEED. It moves the cursor to the end of the line.

Try DELETE. It removes a character to the left of the cursor each time it is pressed. Don't worry about correcting your changes for now.

Use the left arrow key to back up to the middle of a line. Try DEL CHAR. It removes a character at the cursor position each time it is pressed.

Try DEL LINE. It removes everything from the cursor to the end of the line. If the cursor is at the beginning of the line, the entire line is deleted.

Press RETURN. Notice that a blank line is inserted when RETURN is pressed at the end of a line. If the cursor is in the middle of a line, the line is split into two lines.

Type TEST. Notice that each character appears at the cursor position.

Press the up arrow key. The blinking message "linenumber missing" indicates that you must add a line number to the beginning of the line before you leave the line.

The Writing Workspace

Enough practice. Let's use the editor to write a new program.

Type ⟨CTRL⟩/C (hold down CTRL then press C). This leaves the EDIT mode.

Type DELETE ALL, then press RETURN. This clears memory workspace.

Type EDIT, then press RETURN. You are back in the editor with a clean workspace.

USING THE BASIC EDITOR

A Sample Program

Type in the program that follows. Use the editor to correct any errors you may make:

```
10 WAIT FOR KEY
20 K = KEY
30 IF K (= 30 THEN PRINT "TOP"
40 IF K )= 31 THEN PRINT "BOTTOM"
50 GOTO 10
60 END
```

When you are done, type ⟨CTRL⟩/C to exit the edit mode. If you pressed RETURN after line 60, the editor will display the blinking error message: Empty line. You can ignore this message.

Run the Program

Type RUN, then press RETURN.

Try touching the display in several places. Your program easily tells the difference between touching the top and bottom halves of the display!

THE "GETTING STARTED ENVIRONMENT"

System Software

The software provided on this Getting Started disk has been set up to make it easy for you to become familiar with the 1752A Data Acquisition System. 1752A System Software, however, is similar in many ways to traditional minicomputer structure. It includes utility programs for such things as merging, copying, and deleting files, and for setting serial port parameters and the time of day for its internal clock. These capabilities are described in the 1752A System Guide.

At Home With BASIC

Included on the Getting Started disk is a file of 1752A system start-up commands that automatically select BASIC as the programming language and start the first program running. In addition, the start-up command file defines the "home state" of the system to be the BASIC interpreter so that all utility program exits will return to BASIC.

THE "GETTING STARTED ENVIRONMENT"

Some BASIC Tools

As you become more familiar with the 1752A, you may want to look over the files on this disk. They contain some useful tools. Although many of the files on this disk are not documented in this Getting Started Guide, they may prove useful in your applications. Here are just a few examples:

TTIME is a BASIC program that allows the system operator to set the time and date on the Touch Sensitive Display without using the Keyboard.

FORMAT is a utility command file that may be used from within a BASIC program. It allows the system operator to format blank data disks, using only the Touch-Sensitive Display.

MASTER is a general-purpose touch sense menu program that you can use to select and run any number of other programs.

EVERYBODY MAKES MISTEAKS

Error Descriptions

1752A System Software includes numerous checks at many different levels to detect and identify errors. The 1752A System Guide describes system level errors. The manuals for each programming language describe errors such as program syntax errors which are detected and identified by each language processor.

Error Messages

Below are a few common errors that you may encounter while using this Getting Started Guide:

```
?No system on device
```

The 1752A attempted to load system software from the disk following a RESTART, and could not find any. Make sure the Getting Started disk or a System Disk is in place.

```
?Disk not ready
```

This message is normally the result of a disk access when there was no disk in the drive. It can also occur when the door was left open during a disk access.

Help Is Available

If you encounter any other problems, consult either the 1752A Data Acquisition and Control Manual or the 1752A System Guide for more information. Also feel free to call your local Fluke Technical Center or Sales Office for assistance.

MAJOR FUNCTIONS OF THE 1752A

Data Acquisition

The Fluke 1752A is a powerful microcomputer-based system for measurement and control. The Data Acquisition functions and computer are integrated into the same chassis to minimize desktop or rack space, simplify programming, and to increase system performance. The Touch-Sensitive Display provides a friendly operator interface that is easy for you to program and neatly solves the problem of what to do with the keyboard.

System Control

Another task the 1752A does well is to serve as either an instrument controller or supervisory controller for automated systems using programmable instrumentation. An industry standard IEEE-488 interface is included with your 1752A system for interconnecting with other instruments. If you are not familiar with the IEEE-488 standard, a useful analogy is to think of the 1752A as a chairman directing a meeting. The 1752A can designate one talker at a time and any number of listeners. The 1752A can also pass control to other controllers.

BASIC Programming

The 1752A's enhanced, easy-to-use BASIC languages provide a structured programming environment tailored for both data acquisition and IEEE-488 compatible instrument control. The languages contain a variety of single-word commands that simplify the task of writing programs for both data acquisition and IEEE-488 compatible instrument control.

MAJOR FUNCTIONS OF THE 1752A

Analog Measurement

The 1752A Data Acquisition System uses the Fluke Analog Measurement Processor to take voltage and current measurements at 1000 readings per second. (Reading rates of over 1000 readings per second are possible with more than one Analog Measurement Processor installed.) The Analog Measurement Processor is multiplexed to 16 differential channels. Each channel is individually software and jumper configurable as two single-ended inputs or one differential input. Range and filtering are programmable for each channel.

THE MANUAL SET

The 1752A manual set is organized in reference form with multiple access routes to information. These include tab dividers, indexes, section headers on each page, and a consistent readable format. This is supplemented with tutorial introductions and numerous examples to give you hands-on experience and some problem-solving software tools. The following short description of the manuals gives you an idea of which one to pick up next.

1752A Getting Started

The 1752A Getting Started Guide is a short tutorial that helps the new user get started using and programming the 1752A. It includes a companion disk with an assortment of programs that you will find useful elsewhere. A solar cell demo aid is included for use with this guide. (Save this solar cell for later use as a calibration and testing aid.)

1752A System Guide

The 1752A System Guide is a complete reference manual with supplemental tutorial information on the software and hardware system resources available to the 1752A operator or programmer. It includes a section divider for storing this Getting Started guide after you have finished reading it.

1752A Data Acquisition and Control

The 1752A Data Acquisition and Control Manual presents complete documentation for the optional measurement and control modules, including the 1752A-010 Analog Measurement Processor, the 1752A-011 Analog Output, and the 1752A-012 Counter/Totalizer.

THE MANUAL SET

BASIC

The BASIC Manual provides a comprehensive tutorial for learning Fluke BASIC, the standard programming language of the 1752A.

BASIC Reference

A companion to the BASIC Manual, the BASIC Reference Manual is a complete reference source for Fluke BASIC. Commands are presented on separate reference pages that are easy to find and use.

17XXA-002 Parallel Interface Manual

The 17XXA-002 Parallel Interface Manual documents the 17XXA-002 Parallel Interface Board (PIB). The manual is shipped with the PIB and is included with the manual set if the PIB is ordered with the 1752A Data Acquisition System.

1752A Service Manual

The 1752A Service Manual provides comprehensive service information for the 1752A Data Acquisition System and its options. The manual can be ordered using part number 762567.

Options

Optional programming languages, such as FORTRAN, are supplied with a separate manual or set of manuals that rely on the 1752A System Guide. Hardware options are supplied with either a separate manual or an insert for the System Guide, depending on the amount of information.

HOW TO USE THESE MANUALS

Are You New to This?

The answers to most of your questions about the 1752A are in the manual set. The manual set is structured to support both learning and reference access. The following paragraphs are intended to provide you with some direction, depending on your objectives.

Each manual and manual section begins with tutorial information before proceeding to a reference format. Examples are included to allow you hands-on familiarization. We suggest that you do the exercises in this Getting Started Guide first. Then you should work through the 1752A System Guide, skipping the reference material. The system familiarity you gain will prove valuable as you begin programming the 1752A. Then you should work through the BASIC Manual, even if you will be using a different language. Many of the examples and system information are applicable to any language, and you will find that most of the simpler tasks are easier to accomplish in BASIC.

You should plan the development of your measurement and control system using the 1752A Data Acquisition and Control Manual. It contains the information you will need to use the measurement and control capabilities of the 1752A.

HOW TO USE THESE MANUALS

Are You an Experienced Programmer?

Before heading straight for the center of the 1752A Data Acquisition and Control Manual, take a few minutes to look through the 1752A System Guide. The table of contents gives you a quick summary of the kind of system information provided. The consistent internal format and the index make it easy to find information when you need it. The 1752A includes some unique programming capabilities that you will need to understand before you can use them effectively. And, you will not want to miss any convenience features such as the recall feature mentioned under the heading, FIXING TYPING ERRORS.

Are You Evaluating the 1752A?

The 1752A System Guide includes a specification summary and configuration information. With the help of your local Fluke sales office, this information will help you determine if the 1752A is appropriate for your task. You may want to read more specific information about the measurement and control modules themselves. For this information, look in the 1752A Data Acquisition and Control Manual.

Since selecting a computer for measurement and control is too complex to be done on the basis of specifications and configurability alone, each Fluke District Sales Office also has one or more System Engineers available to help you.

HOW TO USE THESE MANUALS

The 1752A User Group

The 1752A is focused more on analog and digital data acquisition needs than general purpose or personal computers that are sometimes adapted for this purpose. This focus is a result of Fluke's 35 years experience building quality industrial instrumentation. You will find this focus in the multi-level customer support available, the capable flexibility of 1752A system software, and the quality of its manuals. These have a major impact on the magnitude of the task required to design and develop your system.

Fluke encourages users of Fluke Data Acquisition Systems to sign up for the 1752A User Group. A periodic newsletter is used as an informal information exchange to create a dialogue with interested users. Ask your local Fluke Sales office for details.